

Chemical Treatment of RIM

West Lake Site

September 26, 2014

OSRTI input

[Key recommendation is provided below **in bold and underlined**. Additional information is provided for context and Region 7 consideration.

The original text in Chapter 4 of the December 2011 Supplemental Feasibility Study (SFS) discusses Technology Screening and Physical/Chemical Treatment in section 4.3.3. The National Remedy Review Board (NRRB) made a comment to undertake additional work on chemical treatment, using apatite as an example. The potential for leaving the complete RIM or partial RIM waste mass in the West Lake landfill setting reaffirms the need to robustly evaluate the technical literature for the merit of potentially using chemical treatment to reduce the mobility of RIM material. The environmental benefit of RIM treatment is two-fold: 1) to address the Superfund preference for treating Principal Threat Waste (PTW) and 2) to eliminate/reduce to acceptable levels the leaching of RIM components to groundwater. The recent 2012 and 2013 Groundwater Monitoring Reports and USGS Groundwater Study indicate the presence of RIM leaching products in groundwater.

Much of the treatment investigation in the SFS for the West Lake landfill was in the areas of separation and solidification technologies. There was some discussion on stabilization technologies that would immobilize the RIM through chemical reactions. Subsequent literature research looked into the use of apatite to immobilize radioactive components in the subsurface and groundwater at DoE sites. **Building on this work, it is recommended that additional literature research be undertaken to identify all relevant literature pertaining to the reduction in mobility of RIM material in landfill environments of appropriate geochemical conditions (solubility and sorption). The additional literature research should include various stabilization agents, for example, but not limited to (phosphates, carbonates, sulfates, sulfides) under current and projected subsurface geochemical conditions of pH and Eh at the West Lake landfill.** The identified site conditions should dictate the best chemical treatment options based on waste, RIM material and geochemical conditions to achieve minimum RIM component mobility.

This activity could be rolled into the Groundwater Fate & Transport Workplan by utilizing the current and projected geochemical parameters (pH, Eh, cations, anions) into a modeling exercise (MinteqA2, PHREEQC) to developing the sorption isotherms, saturation index or stability/solubility diagrams that include the respective stabilization agents as the mineral phases.